

WHAT IS CLAIMED IS:

1. A non-aqueous electrolyte secondary battery comprising a positive electrode, a negative electrode, and a
5 non-aqueous electrolyte, wherein

said positive electrode includes elemental sulfur, and
said negative electrode includes silicon that stores lithium.

2. The non-aqueous electrolyte secondary battery
10 according to Claim 1, wherein

said non-aqueous electrolyte includes a room temperature
molten salt having a melting point of not higher than 60°C.

3. The non-aqueous electrolyte secondary battery
15 according to Claim 2, wherein

said room temperature molten salt includes at least one
type selected from the group consisting of
trimethylpropylammonium bis(trifluoromethylsulfonyl)imide,
trimethylhexylammonium bis(trifluoromethylsulfonyl)imide,
20 and triethylmethylammonium 2,2,2-trifluoro-N-
(trifluoromethylsulfonyl)acetamide.

4. The non-aqueous electrolyte secondary battery
according to Claim 1, wherein

25 said non-aqueous electrolyte includes a quaternary

ammonium salt.

5. The non-aqueous electrolyte secondary battery according to Claim 4, wherein

5 said quaternary ammonium salt includes at least one type selected from the group consisting of trimethylpropylammonium bis(trifluoromethylsulfonyl)imide, trimethylhexylammonium bis(trifluoromethylsulfonyl)imide, and triethylmethylammonium 2,2,2-trifluoro-N-
10 (trifluoromethylsulfonyl)acetamide.

6. The non-aqueous electrolyte secondary battery according to Claim 2, wherein

 said non-aqueous electrolyte further includes at least
15 one type of solvent selected from the group consisting of cyclic ether, chain ether, and fluorinated carbonate.

7. The non-aqueous electrolyte secondary battery according to Claim 6, wherein

20 said cyclic ether includes at least one type selected from the group consisting of 1,3-dioxolane and tetrahydrofuran; said chain ether preferably includes 1,2-dimethoxyethane; and said fluorinated carbonate includes at least one type selected from the group consisting of
25 trifluoropropylene carbonate and tetrafluoropropylene

carbonate.

8. The non-aqueous electrolyte secondary battery according to Claim 1, wherein

5 said silicon is an amorphous silicon thin film or a microcrystalline silicon thin film.

9. The non-aqueous electrolyte secondary battery according to Claim 1, wherein

10 a conductive agent is added to said positive electrode.

10. A non-aqueous electrolyte secondary battery comprising a positive electrode, a negative electrode, and a non-aqueous electrolyte, wherein

15 said negative electrode includes silicon that stores lithium, and

said non-aqueous electrolyte includes a room temperature molten salt having a melting point of not higher than 60°C and a reduction product of elemental sulfur.

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11. The non-aqueous electrolyte secondary battery according to Claim 10, wherein

said positive electrode includes elemental sulfur.

25 12. The non-aqueous electrolyte secondary battery

according to Claim 10, wherein

said reduction product of elemental sulfur is obtained
by reducing elemental sulfur in a room temperature molten salt
having a melting point of not higher than 60°C and an organic
5 electrolyte.

13. The non-aqueous electrolyte secondary battery
according to Claim 10, wherein

said silicon is an amorphous silicon thin film or a
10 microcrystalline silicon thin film.

14. The non-aqueous electrolyte secondary battery
according to Claim 10, wherein

said room temperature molten salt includes at least one
15 type selected from the group consisting of
trimethylpropylammonium bis(trifluoromethylsulfonyl)imide,
trimethylhexylammonium bis(trifluoromethylsulfonyl)imide,
and triethylmethylammonium 2,2,2-trifluoro-N-
(trifluoromethylsulfonyl)acetamide.

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15. The non-aqueous electrolyte secondary battery
according to Claim 10, wherein

a conductive agent is added to said positive electrode.

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16. A method of manufacturing a positive electrode

comprising the step of processing an electrode including elemental sulfur under reduced-pressure with the electrode immersed in a non-aqueous electrolyte, thereby impregnating the electrode with the non-aqueous electrolyte.

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17. The method of manufacturing a positive electrode according to Claim 16, wherein

a pressure during said reduced-pressure process is set to not higher than 28000 Pa.

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18. A positive electrode comprising an electrode impregnated with a non-aqueous electrolyte obtained by processing an electrode including elemental sulfur under reduced-pressure with the electrode immersed in a non-aqueous
15 electrolyte.

19. A method of manufacturing a non-aqueous electrolyte secondary battery including the step of preparing a positive electrode by processing an electrode including elemental
20 sulfur under reduced-pressure with the electrode immersed in a non-aqueous electrolyte.

20. A non-aqueous electrolyte secondary battery comprising:

25 a positive electrode impregnated with a non-aqueous

electrolyte obtained by processing an electrode including elemental sulfur under reduced-pressure with the electrode immersed in a non-aqueous electrolyte;

a negative electrode; and

5 a non-aqueous electrode including a room temperature molten salt having a melting point of not higher than 60°C.

21. The non-aqueous electrolyte secondary battery according to Claim 20, wherein

10 said room temperature molten salt includes a quaternary ammonium salt.

22. The non-aqueous electrolyte secondary battery according to Claim 21, wherein

15 said quaternary ammonium salt includes at least one type selected from the group consisting of trimethylpropylammonium bis(trifluoromethylsulfonyl)imide, trimethylhexylammonium bis(trifluoromethylsulfonyl)imide, and triethylmethylammonium 2,2,2-trifluoro-N-
20 (trifluoromethylsulfonyl)acetamide.

23. The non-aqueous electrolyte secondary battery according to Claim 20, wherein

said non-aqueous electrolyte includes at least one type
25 of solvent selected from the group consisting of cyclic ether,

chain ether, and fluorinated carbonate.

24. The non-aqueous electrolyte secondary battery according to Claim 23, wherein

5 said cyclic ether includes at least one type selected from the group consisting of 1,3-dioxolane and tetrahydrofuran; said chain ether includes 1,2-dimethoxyethane; and said fluorinated carbonate includes at least one type selected from the group consisting of
10 trifluoropropylene carbonate and tetrafluoropropylene carbonate.

25. The non-aqueous electrolyte secondary battery according to Claim 20, wherein

15 a conductive agent is added to said positive electrode.

26. The non-aqueous electrolyte secondary battery according to Claim 20, wherein

 said negative electrode includes a carbon material or
20 a silicon material.